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April 9, 2010

VIA ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: Meeting Notification
RM-11592; RM-11497; WT Docket No. 05-265

Dear Ms. Dortch:

On April 8, 2010, Steven K. Berry, Chief Executive Officer and Executive Director of Rural Cellular Association ("RCA") and the undersigned, met with David Goldman, Legal Advisor to FCC Chairman Julius Genachowski, to discuss the Petition for Rulemaking filed by the 700 MHz Block A Good Faith Purchasers Alliance (the "Alliance"), RCA's Petition for Rulemaking ("RCA Petition") in the Commission's exclusive handset proceeding, and to encourage the Commission to promptly adopt rules that would extend automatic roaming obligations to data services and eliminate the in-market exception.

On the issue of the Petition for Rulemaking filed by the Alliance, RCA representatives explained how self-serving band classes have been established for Verizon Wireless and AT&T for 700 MHz mobile equipment in coordination with the LTE Standards Group, 3GPP. RCA representatives stated that during the course of 3GPP member discussions of whether to create a Band Class 17,[1] Ericsson representatives informed 3GPP members of their concerns about the rationale being provided by

[1] Band Class 17 was designed for the Lower "B" Block and Lower "C" Block 700 MHz licenses held by AT&T.

Motorola, AT&T and other 3GPP members for the creation of Band Class 17.[2] Specifically, Ericsson representatives noted that 3GPP member concerns about interference with reception in the "A" Block did not justify the creation of Band Class 17, particularly in light of the risk of market fragmentation that creation of Band Class 17 would cause. Not surprisingly, both Verizon Wireless and AT&T fail to disclose Ericsson's stated concerns in their initial comments filed with the Commission.

Ericsson noted that "there would be two duplexers covering part of the lower 700 MHz which goes against economies of scales and may lead to market fragmentation" and that "unless there is a severe problem with TX IM and difficult MediaFLO into LTE UE interference scenarios [that] can be identified Band 15 should not be introduced considering the risk of market fragmentation."[3]

RCA representatives stated that by creating these band classes, Verizon Wireless and AT&T have effectively stunted the development of equipment for 700 MHz Lower "A" Block licensees, thereby impeding competition and lowering spectrum valuations to the detriment of all wireless consumers, the FCC, and the U.S. Treasury. RCA representatives indicated their support for the relief requested by the Alliance.

With respect to the RCA Petition, RCA representatives stated that the Commission should move forward expeditiously with a Notice of Proposed Rulemaking to investigate the widespread use and anticompetitive effects of exclusivity arrangements between commercial wireless carriers and handset manufacturers, and, as necessary, adopt rules that prohibit such arrangements when contrary to the public interest. RCA representatives discussed the consumer and competitive harms being caused from the growing use of exclusive handset arrangements by the nation's largest carriers.

On the issue of data roaming, RCA representatives asked that the Commission take prompt action to extend the Commission's automatic roaming rules to data services. RCA representatives explained that the ability for rural consumers to have access to data services while roaming is a critical service offering to consumers and communities, and essential to the competitive viability of regional and rural carriers. RCA representatives also made clear that the expansion of automatic roaming obligations to include data is a basic and fundamental building block of achieving the Administration's goal of providing broadband to rural America, consistent with the Commission's stated goals in developing its National Broadband Plan. RCA representatives explained that there will be a detrimental impact to broadband deployment in rural America if automatic roaming obligations are not extended to data services.

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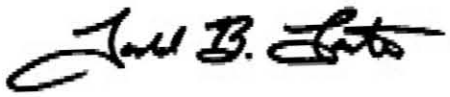
[2] *See* Exhibit 1 ("On the introduction of Band Class 15"), prepared by Ericsson and submitted to TSG-RAN Working Group 4 (Radio) meeting #47bis in Munich, Germany, June 16-20, 2008 (emphasis added) (Band Class 15 later became Band Class 17) ("Ericsson Paper").

[3] *See* Ericsson Paper at 1, 5.

Pursuant to Section 1.1206 of the Commission's Rules, this notification is being filed electronically with your office.

Respectfully submitted,



Todd B. Lantor
Counsel to Rural Cellular Association

cc: David Goldman (via e-mail)
Steven K. Berry (via e-mail)

Attachment

EXHIBIT 1

TSG-RAN Working Group 4 (Radio) meeting #47bis **R4-081356**
Munich, Germany, 16 – 20 June, 2008

Source: Ericsson

Title: On the introduction of Band 15

Agenda item: 6.1.2.2

Document for: Discussion

1 Background

It has been proposed to introduce Band 15 as a subset of the current Band 12 to resolve certain co-existence issues [1]. The current Band 12 covers Blocks A+B+C in the lower 700 MHz band in Region 2, Band 15 would cover B+C (see Figure 1).

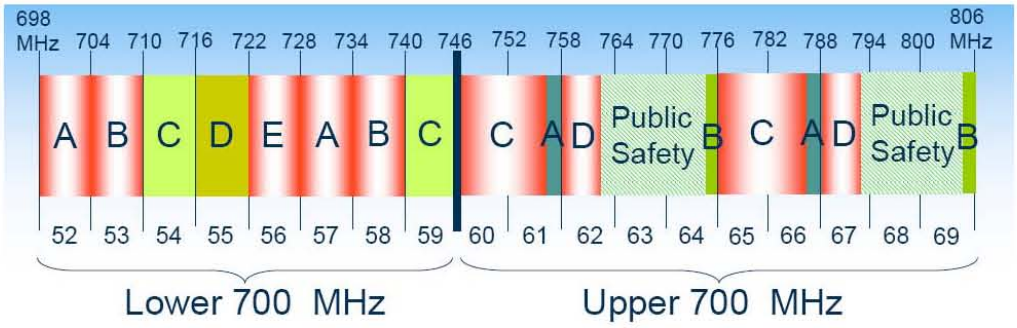


Figure 1 Band plan for Region2.

There are indeed some technical benefits of introducing Band 15, but there are also drawbacks. There would be two duplexers covering part of the lower 700 MHz (it has also been proposed to limit Band 12 to A+B), which goes against economies of scales and may lead to market fragmentation.

In this contribution, some of the co-existence issues are addressed to assess the merits of Band 15.

2 Discussion

2.1 Digital TV in Channel 51 and MediaFLO into eNB

DTV interference into eNB RX is the most difficult of the interference scenarios considered.

For DTV in Ch51 (and MediaFLO in Ch55, Block D/E) there are two interfering mechanisms

- Out-of-band emission (OOBE) from the TV transmitter falling into the LTE RX passband
- eNB RX blocking by an adjacent TV signal. Blocks A and C then the most prone

see Figure 2. The OOBE cannot be mitigated by filtering at the eNB, it must be done at the TV transmitter. Duplex- and additional filter can mitigate the RX blocking.

OOBE is thus not relevant for the Band 15 issue, we only note that for DTV (5 MW eirp) Block A will be significantly degraded in the neighbourhood of the TV transmitter unless 25 dB extra attenuation of a power reduction is supplied at the DTV transmitter, Blocks B and C are not impacted by Ch51.

When analysing the blocking we consider a DTV transmitter with 5 MW eirp (largest transmitters typically mounted in high TV masts) and a MediaFLO at 50 kW eirp. Clearly, a Band 15 duplexer would reduce the DTV blocker level but leave the MediaFLO unaffected.

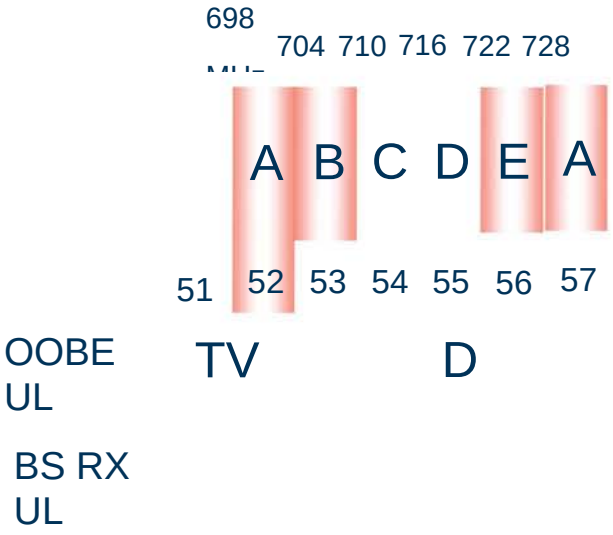


Figure 2 Interference from DTV in Ch51 and MediaFLO in Ch55.

The coupling between the broadcast transmitter and the eNB RX is highly dependent on the relative difference in height (see Figure 3) and the inter-site distance. Examples provided here represent worst case scenarios, in real deployments analysis must by made on a case-by-case basis. Clearly, additional filtering or different duplex arrangements in the eNB is only needed in the vicinity of the broadcast transmitter.

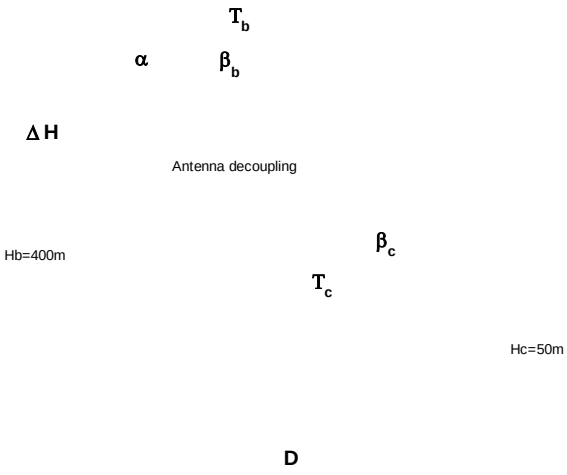


Figure 3

Considering a DTV 6 MHz interference in Ch51 the A block at 6 MHz offset from the broadcast signal will be the most impacted, an additional 35 dB of eNB filtering is needed at 698 MHz, which can be implemented at moderate loss in the RX passband. Block B will be less impacted and it suffices with a 15-20 dB additional attenuation is needed at 698 MHz. However, this can easily be achieved with an external filter for LTE sites close to the broadcast tower and is not a major reason for introducing a Band 15 duplexer.

For MediaFLO at 50 kW eirp the C block will be most impacted, but with some 20 dB extra eternal attenuation at 716 MHz the blocking can be mitigated with less than 1% degradation. Band 15 instead of Band 12 would have a very limited effect here.

To sum up: the interference from DTV at Ch51 does not in itself motivate the introduction of Band 15, for block B+C licence holders additional attenuation can be provided at the eNBs located in the vicinity of the broadcast tower.

2.2 MediaFLO into UE

The next scenario is interference from broadcast transmitting on Ch 55 (Block E) into LTE downlink Blocks A, B and C, see Figure 1. A Band 15 duplexer would then provide extra attenuation for Blocks B and C, but A is the most critical. The broadcast transmitter power is 50 kW eirp. Blocking is the worst case interference here as compared to that of OOBE.

The assumptions for the coexistence simulation are

- one broadcast system at 50 kW from a 138 m mast with a 12 dBi antenna
- a cellular system with a cell grid of 1000 m

The UE will be subject to a performance degradation close to the broadcast site. Figure 4 shows the degradation as a function of distance from the broadcast site for a 5 MHz channel in Blocks A, B and C at 6, 12 and 18 MHz separation, respectively. Block A is the most sensitive with a 1.3% performance degradation in the downlink. Block B is at 0.2%, a Band 15 duplexer would have reduced this further.

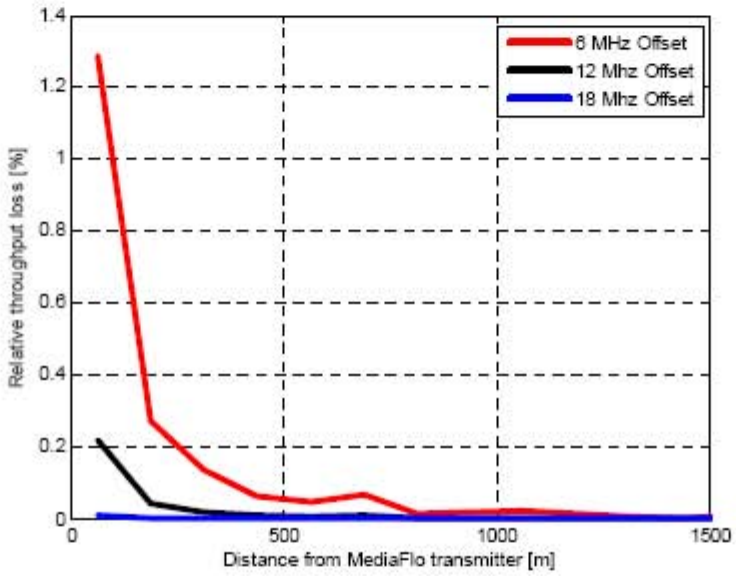


Figure 4 Interference from MediaFLO into downlink Blocks A, B and C.

A 500 m high broadcast tower would also have given a 0.2% degradation for Block B. Summarizing: it is questionable if a Band 15 duplexer should be introduced based on the coexistence results considered above.

2.3 TX IM due to DTV

The last issue considered is UE TX intermodulation of a lower 700 MHz LTE signal with a powerful DTV signal. The latter is a 6 MHz DVB-T signal in Ch 51 centred at 695 MHz transmitted at 5 MW eirp. The intermodulation occurs in the UE TX chain and may produce products falling in the UE transmit and receive bands. For UTRA, TX IM is specified as IM with a CW interferer, which will produce IM products of up to 10 MHz bandwidth. Now we have IM between two wideband signals which will produce a IM product that will interfere over a larger bandwidth but a lower PSD.

We assume that the DTV signal is centered at f_i with the LTE transmitted signal at $f_0 = f_i + \Delta f$ (centered at Blocks A, B and C or combinations). The IM product is produced from the sum of the DTV and LTE signals

$$u = A\cos 2\pi f_i t + B\cos 2\pi f_0 t$$

where *A* and *B* are bandpass signals of bandwidths equal to the DTV and LTE signals, respectively. The TX nonlinearity is modelled as

$$g(x) = \sum_{j=1} k_j x^j$$

Now, the 3rd order intermodulation product will appear at the following frequencies with amplitudes

f_i $\quad k_1 A + \frac{3}{4} k_3 \left(A^3 + 2AB^2 \right)$

f_0 $\quad k_1 B + \frac{3}{4} k_3 \left(2A^2 B + B^3 \right)$

$2 f_0 - f_i = f_0 + \Delta f$ $\quad \frac{3}{4} k_3 AB^2 .$

The IM product at $2 f_i - f_0$ falls into the broadcast band. The product at $f_0 + \Delta f$ may fall into the receive band, considering its amplitude and using the supports of convolution in the spectral domain, it follows that it's located at

$$f_0 + \Delta f \pm \frac{1}{2} \left(BW_A + 2BW_B \right)$$

with regard to the LTE transmitted signal. Table 1 shows the frequency of this IM3 product in relation to the UE receive bands for various scenarios and LTE bandwidths

Table 1. IM3 in relation to the LTE receive band for a 6 MHz DTV interferer in Ch 51.

LTE Block	Interferer separation Δf MHz	IM3 frequency MHz	LTE receive band MHz
A (5 MHz)	6	699-715	728-734
B (5 MHz)	12	711-727	734-740
C (5 MHz)	18	723-739	740-746
A+B (10 MHz)	9	700-726	728-740
B+C (10 MHz)	15	712-738	734-746

For the 5 MHz LTE cases the IM3 will not overlap with the receive bands and the TX duplexer will provide more than 40 dB of attenuation outside the transmit band, so these products will likely not be blocking the UE receiver. The level depends on the linearity of the TX, the intermodulation requirements and required linearity is still TBD in TS 36.101.

There may be a problem for 10 MHz channels in B+C where part of the IM product will fall into the receive band (a problem even if the duplexer provides attenuation). The TX filter of a Band 15 duplexer could then decrease the DTV signal, but the reduction as compared to a Band 12 duplexer is still TBD as there are few 700 MHz filters available at present (ongoing work).

Looking at the frequencies of the IM3 products it appears that the only scenario that motivates a Band 15 duplexer is the 10 MHz LTE allocation in B+C for terminals used in the vicinity of broadcast transmitters. TX IM problems would of course also be alleviated for Block B channels.

3 Proposal

Collecting the results

- starting with the most difficult case, DTV and MediaFLO interference into eNB, we note that this requires additional filtering in the eNB in the vicinity of the broadcast tower for duplexers involving Block A (i.e also for the current Band 12), for Block B the filter requirements are less stringent
- MediaFLO interference into the LTE downlink will be most severe for Block E broadcast into Block A downlink, but it appears that the degradation does not translate into more than a percent of performance loss for LTE

- TX IM could be a problem for B+C licence holders when 10 MHz channels are deployed near big 5 MW eirp DTV transmitters

The first item above can be solved by external filters at the eNB close to the broadcast site and does not motivate a Band 15 duplexer in all eNB since the requirements on the external filter for Block B+C would not be difficult (Block A provides a guard). MediaFLO interference into Blocks B and C is a smaller problem than A assuming a Band 12 duplexer.

The TX IM in the vicinity of high-power broadcast transmitter will be alleviated for Block B, but the extra attenuation of the TX dupler is still uncertain. The isolation has to provided on the “wrong” side of the TX duplexer filter that needs to provide high attenuation in the RX band on the other side of the passband.

Unless there is a severe problem with TX IM and difficult MediaFLO into LTE UE interference scenarios into can be identified, Band 15 should not be introduced considering the risk of market fragmentation. However, the interference issues will remain for Block A holders regardless of Band 15 and still needs to be resolved. Nevertheless, the risk of interference will always be higher for Block A holders.

References

[1] R4-081108, “TS36.101: Lower 700 MHz Band 15”, Motorola